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FOREIGN AGRICULTURE REPORT
OFFICE OF
FOREIGN AGRICULTURAL RELATIONS
U.S. DEPARTMENT OF AGRICULTURE
WASHINGTON, D.C.

COTTON PRODUCTION IN PAKISTAN

NOV 6

by

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FOREIGN AGRICULTURE REPORT No. 42 OCTOBER 1949

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COTTON PRODUCTION IN PAKISTAN

by

Henry W. Spielman

The voluntary decision of the British Government to relinquish its authority in the sub-Continent of India and the establishment on August 14, 1947, of Pakistan and the Union of India as self-governing dominions were historic events of extraordinary political importance. The economic effects of these developments are of great significance. This seems to be particularly true as they relate to cotton.

British India at the time of partition had stood for many decades second only to the United States in the production of raw cotton. In cotton manufactures also it has attained second place, though this position had been occupied for a much shorter period. Its trade position in raw cotton was that of a major exporter, although like the United States it imported annually some cotton of special qualities - in recent years the equivalent of about 400,000 bales of American weight. In cotton textiles, India, despite its large production, was a net importer but approaching self-sufficiency. Actually, in one or two of the war years, a part of its cloth production had been spared for export to allied countries less well-supplied.

The cotton of the sub-Continent is of two major types, the short staple desi, or Asiatic, type grown mainly under monsoon conditions and the longer staple American, or Upland, type, which has been acclimatized and adapted for production mainly under irrigation in the northern districts. The cotton mills are located in two main centers, Bombay and Ahmenabad.

Partition brought a profound change to the cotton economy of the region. To the Union of India went nearly the whole of the cotton mill industry and roughly two-thirds of the raw cotton production. As this share of the production was insufficient to supply its mills, the Union of India became overnight a net importer. Moreover the bulk of the cotton grown in the Union is of the short staple (desi) type, of which the total production is more than the Indian mills are prepared to use. Thus, although the Union exports a part of its own production, its net deficit in consequence of partition is of the order of a million American bales.

Pakistan's production, by contrast, is largely of the American type, and, lacking the mills to utilize more than a very small part of its crop, the country became upon partition a major exporter. In fact, under normal conditions, Pakistan may be considered a contender for first place among exporting countries, other than the United States, of cotton in this general category.

The cotton produced in Pakistan for the most part varies from 15/16 to 1-1/16 inches staple length. Even the short desi cotton has a market. It is used in many countries for mattresses, cotton blankets, upholstery, and padding for clothing. For these special purposes it is desired because it is wirey, springs back into shape, and does not form lumps.

In point of its importance in the economy of Pakistan, cotton is second only to jute as a producer of needed foreign exchange. In West Pakistan, it is the most important crop grown. Unfortunately for Pakistan, its cotton crops have not been large since it became an independent nation. The 1947-48 crop was greatly disrupted by the mass migration of people, mostly cultivators, after partition. The 1948-49 crop was small because the new cultivators were not familiar with growing cotton under irrigation conditions and because of the floods during the planting season and the cutting off of water of two rivers by India in April.

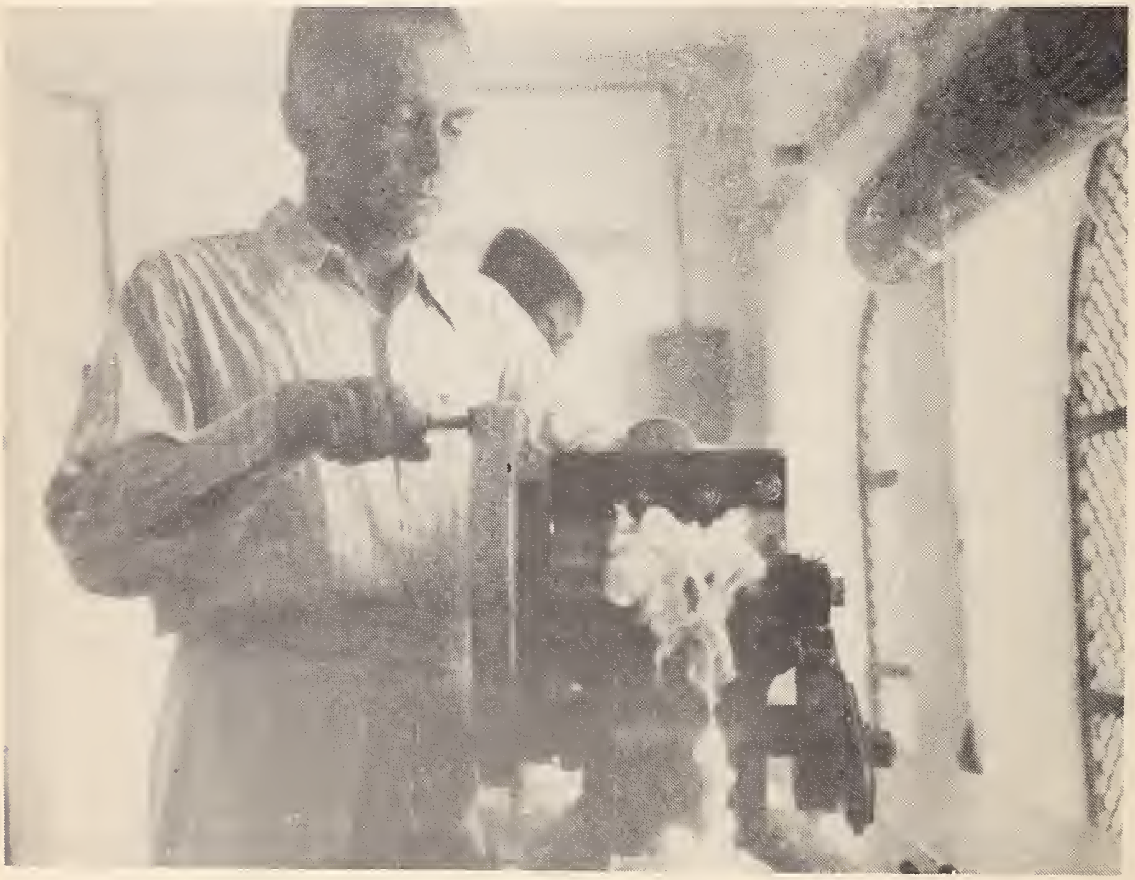

FIGURE 1.- Dr. R. Sankaran, who contributed greatly to the development of new types of cotton for Sind, tests the ginning percentage of one of his new strains.

RESOURCES OF PAKISTAN FOR COTTON PRODUCTION

Topography

Principal cotton-producing regions of Pakistan, the Punjab, Bahawalpur State, and Sind are located in the flood plain of the Indus River and its tributaries. From the foot hills of the Himalayas in the Punjab to the mouth of the Indus the land is level and has little elevation. Lahore is 702 feet above sea level, and yet is 750 miles from the sea. Thus the land falls less a foot a mile over most agricultural sections of Western Pakistan. Fortunately, the fall is in two directions, to the south and west, making irrigation easy. On the other hand, the very level topography of the land means poor drainage in many areas.

Soils

Soils in the area vary considerably from sand to clay. The high-yielding soils are a loam to clay loam. Most of the soils are greyish brown in color, but some in the Thal project are reddish. All of the soil is easy to work when some moisture is present. If the land is allowed to bake before plowing or cultivating, it becomes exceedingly hard. In fact, the soil is so hard that many of the houses in the Punjab are built from sun-baked surface soil.

Climate

Climate is one of the most important factors influencing cotton production in Pakistan. Before irrigation was introduced 50 years ago, practically all of the cotton area was a desert. The rainfall varies from 3 inches at Mirpurkhas to 18 inches at Lahore. Most of the rain falls between July and September. The snowfall in the Himalayas has been consistent and in sufficient quantity to supply water to the five rivers, which are the life blood of Western Pakistan.

The temperatures vary nearly 100° F. from the summer high to the winter low. The hottest months in all of West Pakistan are May and June. Shade temperatures frequently reach 120° while ground-surface temperatures will reach 190°. Frosts generally occur during Christmas week but have damaged crops as early as November 20. In February, temperatures begin to rise, but damaging frosts have been recorded late in that month.

Water

The entire economy of Western Pakistan depends upon the amount of water flowing in the five Punjab rivers. West Pakistan is one of the world's largest irrigated regions. More than 18 million acres depend entirely upon irrigation water to produce cotton, wheat, rice, sugarcane, and oilseeds. The Indus, Jehlum, and Chenab Rivers have their headwaters in Kashmir. The Ravi and Sutlej Rivers arise in India. Actually at the present time the Indus River irrigates very little of West Punjab but is used primarily in Sind.

There is more than twice as much water available in summer as in winter. As the snow melts in the mountains in spring and summer, it fills the rivers and later the canals to water cotton, sugar, and feed crops. The large amount of water available during the summer is fortunate since the high temperatures draw tremendous amounts out of the ground. During the winter months, less water is needed because the temperature is considerably lower and there is more moisture in the atmosphere.

Consequently, more land can be irrigated in winter than in summer. For this reason the winter wheat acreage is higher than that for all other crops combined.

One of the most important rivers supplying water to the Punjab is the Jhelum. The water is taken out of the river in Kashmir and diverted to the Chenab. It flows a short way down the Chenab and is diverted to the Ravi from which water is taken to supply the Montgomery and Multan districts. The area between the Jhelum and the Ravi is irrigated from the Ravi and the Chenab. The rivers arising in India serve the area around Lahore and Ferozepur and to a certain extent the districts below the Sutlej River and in Bahawalpur State.

Irrigation water for Sind comes from the Sukkur Barrage on the Indus River in upper Sind.

Labor Supply and Wages

In the main cotton-producing areas of West Pakistan, there is ample labor to do all farming operations. Unofficial estimates indicate that 3 million Hindus and Sikhs left Pakistan after the partition but that 6 million Moslems entered the country. One of the major problems facing the Government is that of finding employment for this large unsettled population. Logically, agriculture has been one of the main absorbents.

The Lower Sind Barrage when completed is expected to take about 220,000 agricultural workers in addition to the 72,000 now in the area.

During the first two crop years the new arrivals had some difficulty in adjusting to irrigation farming. Most of them were accustomed to growing varieties of cotton that could be produced under rainfall conditions. And most of them came from areas where only one variety of cotton predominated. On arriving in Pakistan, they preferred to grow the only type of cotton with which they were familiar - desi. During the past two seasons, these cultivators have discovered that it is more profitable to grow the Punjab American types of cotton and are rapidly shifting to these better varieties.

Day farm wages vary from roughly 20 cents to 30 cents. The worker furnishes his own food. Monthly rates generally vary from about $10 to $25, depending upon the skill required. The few tractor drivers receive as much as $25 a month plus house, fuel, and water with food at wholesale rates. In Sind, day labor is paid as much as 7 cents a day, plus house, fuel, and water.

Generally, pickers are paid in kind. The amount they receive varies with the amount of cotton in the field. At the height of the season, pickers receive 10 percent of the cotton they pick. When there is less cotton in the field, they receive up to 15 percent. The picker may receive actual seed cotton, a credit slip, which can be cashed at local stores, or cash payment every 2 weeks. It is common, in the Punjab particularly, to see in local stores stacks of seed cotton received in payment for goods purchased by cotton pickers. This method of trading illustrates the barter nature of much of the rural economy of West Pakistan.

Irrigation Developments

West Pakistan, as already noted, is very dependent upon irrigation. Without it the fertile valleys would be deserts inhabited by nomads with their flocks.

In addition to the existing irrigation projects, which they are now improving, the Governments of West Punjab and Sind are developing two other large irrigation regions - the Thal project on the Indus in northwest Punjab and the Sind project below Hyderabad. The first is scheduled for completion in 5 to 8 years. It will irrigate between 1.5 and 2 million acres of land east and south of the Indus. The Government plans to settle a number of refugees in this area. The land will be used primarily for producing wheat, sugar, cotton, and to a certain extent rice. Not more than a third of the area is expected to be in cotton.

The Sind project will irrigate 2.7 million acres when completed in the next 40 years. More than a million acres can be irrigated as soon as the dam is completed in 1953-54. Nearly all of the land will be used for rice production, the crop that has been grown under the present inundation system. Government officials say that some of the new land in this project may be planted to cotton, but the area will be small.

Gins

Roller gins in Pakistan are either of Indian or British make. The majority are single roller. In addition, there are a large number of saw gins in both Sind and Punjab. During the 1948-49 season, few of the saw gins were in operation since most of the production was earmarked for India. The saw gins are practically all equipped with line-drum cleaners for seed cotton, four-drum horizontal cleaner feeders, or pneumatic feeders. The gin stands have huller and pneumatic doffers. The presses for the saw gins are the same as those for the roller gins. Most of them are made by English, Swiss, or German firms. In the Punjab, practically all the gins are operated by coal. In Sind, about half of them are operated by fuel oil, a few by artificial gas, and the remainder by coal.

Warehouses

Practically all of the cotton gins have some form of warehouse, generally fireproof. Because of the small amount of rain in all of the cotton-growing areas, cotton can be stored in the open. Each gin has a high wall around its compound, so there is little danger from thieves or passers-by setting fire to the cotton stored in the open. No smoking is permitted in the gin compound. No kitchen matches are used and consequently there is little danger of fire from matches being left in seed cotton.

In Karachi, there are only a limited number of fireproof warehouses. Much cotton is stored in the open, behind a fence. During the current season the cotton was stored with little regard for fire safety measures. Piles and piles of cotton were stacked in almost a continuous row without fire breaks and with only a few drums for water, which were frequently empty. Fortunately, there is considerably less smoking among the general public in Pakistan than either in the United States or Brazil; otherwise fires would probably be much more frequent.

Transportation

Most of the irrigated sections of the Punjab, Bahawalpur State, and Sind are serviced by a broad-gage railway system. Eastern Sind is serviced by a narrow-gage railroad, which runs from Hyderabad to the Indian border. Since partition, these railways have been efficiently operated both for freight and passenger service.

AGRICULTURAL PRACTICES

Farm Tenure

Most farms in Pakistan are operated on a share-crop basis. The landlord furnished the land and the water and the tenant, everything else. Farms of 15 to 25 acres require two teams of two animals each and two sets of tools. The tenant gives half of the crop to the landlord, who is generally the only cotton buyer in the market.

FIGURE 2.- Cotton research laboratory of West Punjab. This is the principal experiment station for the improvement of Punjab-American cotton.

Cropping System

The cotton-growing region of West Pakistan may be divided into two more or less indigenous areas based upon the two irrigation systems. The older cotton-growing areas of West Punjab and Bahawalpur State follow one cropping system, while Sind, which is irrigated from the Sukkur Barrage on the Indus, follows another system. In the upper or northern system, cotton is grown in a haphazard rotation with wheat, oilseeds, pulses, and sugarcane. Wheat, oilseeds, and pulses generally are winter crops, while cotton and sugarcane are summer crops. Most independent cultivators try to produce enough wheat and sugarcane to supply their own requirements, growing cotton as a cash crop. On the larger farms a more or less definite rotation is followed. A typical farm of 25 acres would have about 7½ acres in cotton and 3/4 acre in sugarcane during the summer months. The remaining land would be fallow. In September, before cotton picking begins, the land will be prepared for wheat and other winter-grown crops. Water requirements of the winter crops are naturally lighter because of the nature of the plant and because transpiration is less during the cool weather. Consequently, the area planted to winter crops is about 2½ times that of summer crops. Wheat acreage on individual farms is about twice the cotton area.

In Sind, cultivated cotton acreage is restricted to 27 percent of total farm acreage. Wheat, a winter crop, is limited to 40 percent. In areas where it is possible to grow rice, as many acres can be planted to rice as there is water available. By far the greater part of the remaining 33 percent is unsuited for rice cultivation because of the danger of water logging. Therefore, it remains fallow every third year.

Land Preparation

The irrigated lands of the Punjab and Sind are inclined to bake, requiring extensive plowing before planting can be effective. Practically all areas of West Pakistan land is plowed six to eight times. After the land has remained idle through the winter, or if it had a winter crop, it is given a light irrigation. As soon as the land is in suitable working condition, it is plowed on one direction, cross-plowed, and dragged level with a board. It is then replowed in two directions and releveled. A light irrigation is applied and the land is plowed twice again. By this time the earth has been worked into a smooth, firm seedbed.

Planting

Ninety-eight percent of the cotton in the Punjab and Sind is sown broadcast. The seed is generally soaked for 2 hours the evening before and allowed to dry overnight. It is then carried to the field and broadcast by hand as wheat and other cereal crops were broadcast in the early days in the United States.

The remaining 2 percent of the cotton is planted in rows with an indigenous type of row planter. If planting is done in the latter part of May the rows are 2 feet apart; if in the middle or latter part of June, the rows are 18 inches apart. Both one-row and two-row planters are used. The preparation of the seed for row planting is slightly different from broadcast. The seed is soaked as before but is rolled in a mixture of cow dung and sand so that each seed becomes individually free of the other. The seed is stored in a damp burlap bag overnight.

In both broadcast and row planting the planting begins at daybreak and continues until about 10 o'clock in the morning. By that time the temperatures are so high that field work is impossible.

Yields

Per acre yields of cotton vary greatly even within the same district. Yields of American-type cotton are higher than desi cotton, primarily because American cotton is grown on better and irrigated land. Desi cotton is frequently grown under rainfall conditions only. Broadcast-planted cotton yields about 150 pounds per acre. Row-planted cotton, given cultivation and grown on land that was previously manured, will yield as high as 330 pounds net per acre. The average yields of Pakistan cotton are about twice those for the Union of India.

Cultivation

After the cotton plant has put out its second set of leaves, row-planted cotton is lightly cultivated. Thereafter, it is cultivated after each watering. Broadcast cotton is cultivated with an indigenous wooden plow pulled first in one direction and then in the other across the field. Generally three to four cultivations are carried out during the season. On both row and broadcast plantings, hand-weeding is done when the cotton is about 18 inches high.

Fertilization

No fertilizer is used on the cotton crop in Pakistan. Manure, and sometimes ammonium nitrate, is applied to wheat or forage crops. Naturally, some fertility remains in the soil to help increase cotton yields when cotton follows in rotation.

Harvesting

In all of Pakistan, harvesting is considered a woman's work. Generally the women of the family, along with the children, will go into the field and pick most of the day. Harvesting is frequently a social affair for the women.

An average picker will harvest 50 to 100 pounds a day depending on the yield per acre and the season. Naturally, during midseason when a large number of bolls are open, the amount picked will be considerably greater than when only a few bolls are open, as during the beginning or end of the harvest season.

MARKETING

Selling Methods

Many cotton cultivators in Sind and Punjab produce less than a bale of cotton. Even those who produce more than one bale frequently do not have enough to make the second or possibly the third bale. As a result, they sell to local traveling buyers or local merchants. These merchants try to keep the different qualities in different piles before selling directly to the ginneries. Some of the larger ginneries also have their own buyers in the villages to purchase the locally produced cotton from cultivators or local merchants. Except in the cases of large landlords, all cultivators sell their cotton in the seed.

Ginning and Handling

Seed cotton may be hauled to a local concentration point on a railway or to a cotton gin by the original cultivator or by contract transporters. A common method for moving cotton to gins is by camel. A camel can carry two bags of 300 pounds, one on each side. As the large burlap bags are delivered to the gin, they are weighed, emptied, and the cotton is graded. Each grade is put on piles of similar grade of seed cotton. It is common to see piles of seed cotton 100 feet long and 20 feet high.

Each pile of a uniform grade is ginned at one time. The gin operator can generally tell by the quality whether the cotton will be going to Indian or to European countries. Practically all the cotton going to India must be roller ginned. Indian mill operators are accustomed to handling roller-type cotton and will buy saw-ginned cotton only at a discount.

Before the cotton actually enters the ginning factory, it is taken to a cleaner-opener where it is well mixed, cleaned, and opened. From there, it is carried by hand upstairs to gin stands. One female operator sits behind each gin stand and pushes the cotton uniformly into the rollers. The lint falls on the floor at the foot of the gin stands, while the seeds drop to the floor below. The lint is picked up by men and boys and taken to a warehouse. If the cotton is unusually dry, and it frequently is in all of Pakistan, it is spread out in the gin yard overnight so that dew can condition it for pressing. Sometimes a small amount of water is sprinkled over the cotton. Even so, some of the cotton may be too dry to make bales of more than 390 pounds gross weight.

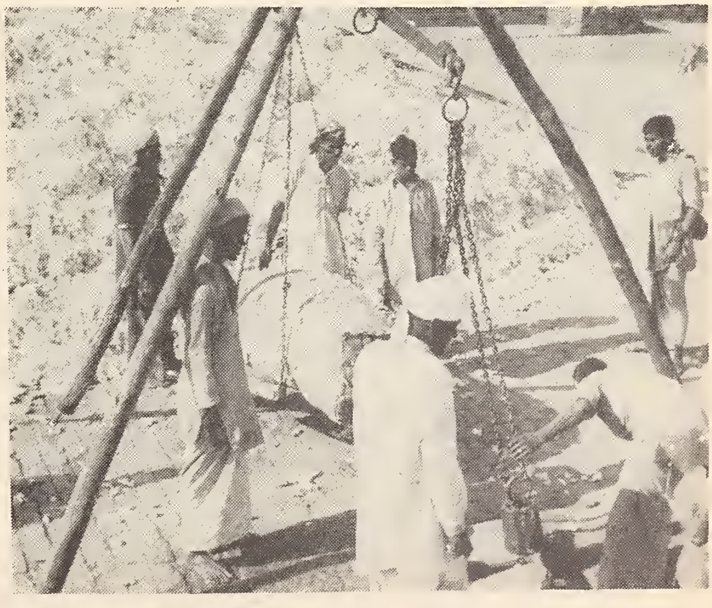

Figure 3.- When it arrives at the gin, seed cotton is weighed on balance scales.

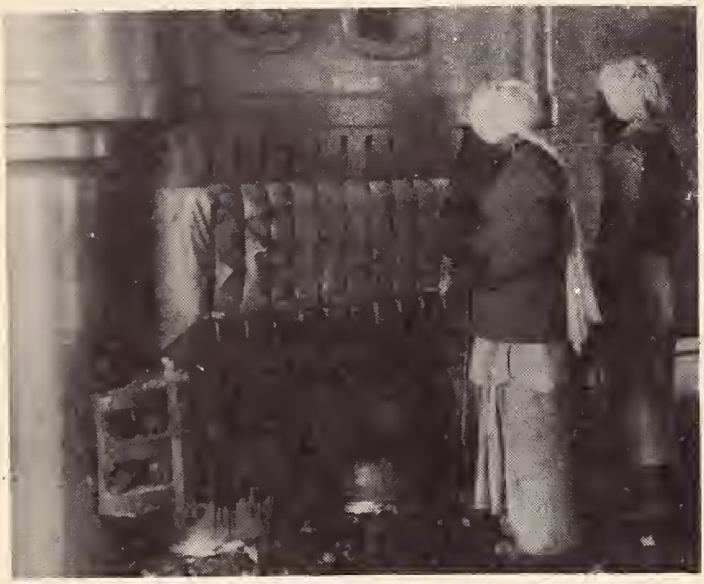

FIGURE 4.- A partly made cotton bale is put in a high-density press.

The lint is weighed before it is put into the press. Thus, bales of uniform weight are produced. After weighing, the lint is carried by hand to the press box and tramped in by men. After the required weight is in the press box the heavy steel doors are closed. The initial press produces a bale of about 28 pounds per cubic foot. This light density bale is moved to a heavier press where the density is increased to 38 to 40 pounds per cubic foot.

The bales are completely covered with burlap, about the weight of gunny bags and tied with 11 steel bands. Actually, there are not 11 separate bands, but only 3, which are wrapped around the bales. The ends are tucked under the strips; no buckles are used. The bales are then marked with the gin number, press number, name of gin where pressed, gin bale number, and the weight. If the cotton is from improved seed produced under the supervision of the Department of Agriculture, an additional marker so indicating is applied.

Preparation for Shipment

All of the cotton in Pakistan, which is not used for local consumption, is pressed into high-density bales for rail shipment to Karachi. Prior to the 1948-49 season, most of the cotton was bought upcountry by cotton merchants. They were familiar with the quality of cotton before it was ginned and were able to prepare uniform lots without sampling. Only after the cotton arrived in Karachi were samples drawn. Generally, they were drawn from bales only as the firm sold cotton to other shippers or prepared it for export. When sampling, the general custom is to take a 10- to 15-pound sample from two to three bales out of each 100-bale lot. If some irregularity is found in these bales, small samples may be cut from other bales in the lot. The custom of sampling every bale, as in the United States, is not followed in either India or Pakistan.

Firms in the Market

Prior to the 1948-49 marketing season there were about 30 firms in the Karachi market. Most of them were European or Hindu. After partition, many of the Hindu firms withdrew their offices from Karachi or added Muslim partners. During the first year of Pakistan's independence a number of Muslims entered the cotton business, and formed the Pakistan Cotton Association.

COTTONSEED PRODUCTS INDUSTRY

At the beginning of 1948-49 season, 26 cottonseed-oil mills were in operation. Most of them were in West Punjab. This number is not significant since many of the mills have only 1 to 3 presses. Only 4 have as many as 11 presses. About 7 percent of the Punjab crop and a much smaller percentage of the Sind crop is crushed for oil. The rest of the seed is used for planting or is fed to cattle, either locally or in India.

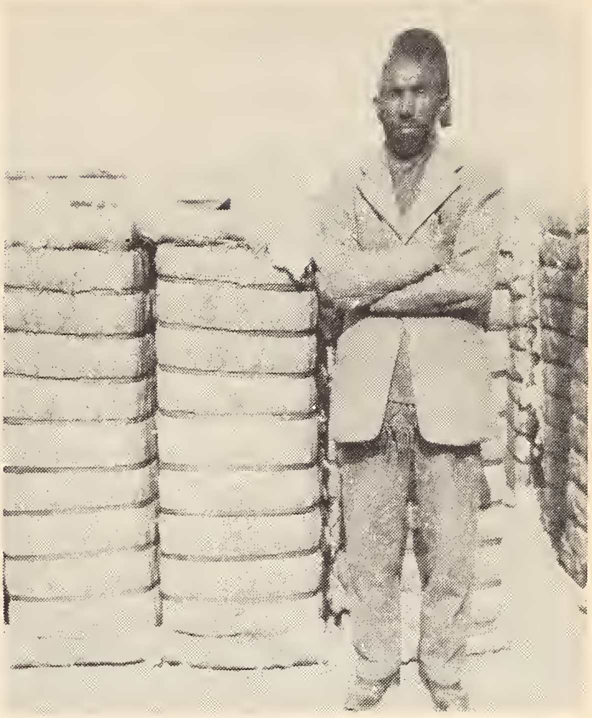

FIGURE 5.- Pakistan cotton bales are completely covered with burlap and tied with 10 to 11 bands.

Before crushing, most mills remove a small amount of lint from the seed. The seed then receives superficial cleaning before going to the cookers, or, in a few instances, to decorticators.

The largest oil-mill operator in Paskistan has estimated that therewere 10 up-to-date expellers in Pakistan, which were shipped from the Philippines where they had been used for crushing copra. Since the seed is not decorticated, the hull gives the oil a black color, which is removed along with the fatty acids. After filtering, the oil varies from a straw to a golden color. At present, most of the oil is sold to soap manufacturers.

As more expeller machinery becomes available, the crushing industry will expand. Already a large English firm in cooperation with local partners is planning to build a mill in West Punjab. This company will make hydrogenated cooking oils as well as soap. It also plans to crush other locally grown oilseeds.

To encourage the crushing industry, the Government of Pakistan has a program for processing all oilseed locally and exporting only the oil. The cake will be used for cattle feed and fertilizer. If an ample supply of cottonseed were allotted for planting purposes only and the remainder crushed for oil, Pakistan could produce from 40,000 to 50,000 tons of cottonseed oil a year. This quantity would be more than adequate to supply the country's requirements for vegetable oils. At present, not more than 3,000 tons of cottonseed oil are produced in Pakistan.

Experiments conducted on civilian and military farms indicate that both cattle and buffalo will eat cottonseed meal, as well as other oilseed meal. It is entirely possible that an outstanding vegetable-oil industry could be developed in West Pakistan.

PROBLEMS OF COTTON PRODUCTION AND OUTLOOK

Problems

For the past 6 years, acreage has been decreasing. At present, there is no reason to think the trend will change until the new irrigation projects can be brought into operation.

The basic cause of the decline is the amount of irrigated land going out of production each year because of water logging and salinity. Government officials, landowners, and members of the cotton trade estimate that between 65,000 and 85,000 acres a year are being rendered useless because of improper drainage. This loss has been going on for the past 10 years.

An indication of the difficulty is the rate at which the water table is rising. In many places the water table was 40 to 50 feet below the surface before irrigation was practiced on a large scale. Now it is within 20 feet and in some places 15 feet of the surface. In some places it is practically on the surface. For safe crop production, the Department of Agriculture would like to keep the level at least 10 feet below the surface.

Some thought is being given to this problem. Attempts have been made in the past to flush the land by flooding. The excess water washes out the salts near the surface. Generally, this is done through rice cultivation. This method has had limited success, but the total acreage lost each year has not been cut. Even rice land of this type becomes water-logged.

Around Lyallpur, efforts have been made to drain the excess water through drainage ditches. Here a problem arises how to dispose of the water. If the water contains a small amount of salt, it can be pumped back into an irrigation canal. Unfortunately, much of the water is too salty for such disposition. Unlike Egypt, Pakistan has no nearby desert on which to "dump" salty water. Another difficulty with the drainage method is the cost. The construction of drainage ditches costs nearly as much as the original irrigation system. The present yields of even good land are so low that the additional expense could not be met unless yields were increased substantially.

Another factor contributing to declining cotton acreage is the shift to food production. In 1943 the Government of India began a "Grow More Food" program designed mainly to divert cotton and other nonfood-crop acreage to the production of food. The decline in cotton acreage began then. Food production will continue to be given preference over cotton now that Pakistan is separated from India. Before partition, part of the country's food came from India. Now Pakistan must try to feed its own population, which numbers more than 80 million and is steadily increasing.

The country has a difficult problem to solve because it needs cotton to earn foreign exchange.

Outlook

Pakistan cannot increase its cotton production substantially until the new irrigation projects are completed, making additional land available. This means a minimum of 5 to 8 years, when the Thal project in West Punjab will be finished. Then, about a third of the area's 2 million acres will be planted to cotton, increasing acreage by a fifth.

The Government will probably try to increase cotton production before that, however, by introducing measures to step up acre yields. A beginning was made during the present crop year when cultivators were supplied with improved seed, metal for their farm tools, and, to a limited extent, fertilizers.

Nevertheless a rapidly increasing population to feed and with former Indian supplies no longer readily available, Pakistan must continue to use much of its farm land for food and feed production.